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FRESH RELICS OF GLACIAL MAN AT THE BUFFALO MEETING OF THE A. A. A. S.

BY G. FREDERICK WRIGHT.

1. The first paper upon this subject was presented by Prof. G. Frederick Wright, detailing briefly the results of a single day's exploration at Trenton, N. J., under the guidance of Mr. Ernest Volk, who is continuously carrying on similar explorations under Prof. F. W. Putnam for the Peabody Museum at Cambridge and the Central Park Museum, New York City. Professor Wright was requested to select his own ground upon the Lalor farm, where permission has been given for exploration, and the surface to a depth of three feet would be dug over in his presence. The point selected is on the bluff of the terrace of glacial gravel upon which the city of Trenton is built, a mile or more south of the center of the city. The bluff here facing the river is about fifty feet above it, and the terrace stretches back in a dead level for a mile and a half. The situation is such that there was no chance for surface wash to have remodified the deposit. In the near vicinity were boulders two or three feet in diameter resting upon the surface, or slightly below it, showing the ordinary conditions of deposition in connection with floating ice which characterized the whole delta terrace at Trenton, and which have been so often described by the geologists who have visited the region.

A trench three feet deep and three feet wide was dug from the face of this bluff backwards about thirty or forty feet. The upper twelve inches of this trench consisted of sand discolored with vegetable decomposition, which had evidently been disturbed. In this stratum there were found two flint arrowheads or spear-heads, one argillite chip, and one flint chip, together with a fractured pebble, four pieces of pottery, and a piece of charred bone.

The lower two feet of the excavation, except where interrupted by a pit, consisted of compact sand distinctly stratified, which had clearly been undisturbed. In this was found at varying depths one imperfect argillite implement, about three inches long and an inch and a half wide and a quarter of an inch thick, with five unrolled and angular fragments of argillite, two of which bore pretty clear evidence of having been chipped by human hands. These were the only fragments. There were no chippings or fragments of flint or jasper in the lower two feet of the excavation.

This brief paper of Professor Wright was but the prelude to bring out from Professor Putnam a fuller statement of the results of Mr. Volk's work on the Lalor farm. For two years Mr. Volk has been carrying on similar excavations over adjoining parts of the farm where the situation is similar to that described, and with corresponding results. Flint and jasper implements and flakes are abundant in the upper twelve inches of the soil, while no flint or jasper occurs in the lower two feet, of undisturbed sand and gravel. A large number of boxes of implements and fragments accumulated by this work of Mr. Volk have been sent up to the museums above mentioned; but, owing to the lack of time, Professor Putnam has not yet opened them and published the results. But in preparation for this meeting Professor Putnam had requested Mr. Volk to pursue further investigations and send the results to him at Buffalo. These were presented by Professor Putnam in a paper from Mr. Volk describing between thirty and forty argillite implements and fragments which had been found in his subsequent excavations in the undisturbed lower two feet of sand, as described in Professor Wright's excavation. As in that case, so in this, flint and jasper were abundant in the upper twelve inches, but argillite was the only chipped and angular material found in the lower two feet. A large diagram accompanied Mr. Volk's description in which the position of each one of these argillite fragments was found. The box was then opened for the first time, and the fragments presented for examination. Of the artificial character of many of them there was not the least question on the part of any one present.

The importance of these discoveries as confirming the evidence of glacial man at Trenton heretofore presented can readily be perceived. It coincides with that presented by Professor Putnam and Dr. C. C. Abbott and Mr. Volk, going to show that there was a clearly marked succession in the human occupancy of the Delaware Valley indicated, first, by the sole use of argillite for implements, followed by a gradual and almost complete transition to the use of flint and jasper in later times. (See Putnam's report to the Peabody Museum in the Proceedings of the American Antiquarian Society, October, 1889, p. 11, and Observations upon the Use of Argillite by Prehistoric People in the Delaware Valley in Proceedings of the American Association for the Advancement of Science, by Ernest Volk, vol. xlii, p. 312). It also sweeps away at once the ingenious theories of Professor Chamberlin and others who would account for the occurrence of implements in the lower strata of sand and gravel through the agency of dry-weather cracks in the surface, the overturning of trees, the decay of tap roots, and the activity of burrowing animals; for none of these agencies would select the argillite, and leave the flint and jasper upon the surface. Therefore it would seem that there can be little doubt that these argillite fragments were scattered by the agency of man at the time that the deposition of the Trenton gravels was still in progress.

2. A second paper was by Prof. E. W. Claypole, detailing the particulars concerning the discovery of human relics from the drift at New London, Huron County, Ohio. These consisted of what would be called Neolithic axes, found by an intelligent workman in the process of well-digging in the blue till twenty feet below the surface. The circumstantial evidence

sustaining the testimony of the workman is of the most convincing character. The passage from the yellow till into the blue till and the occurrence of occasional strata of gravel are characteristic of the glacial deposits of northern Ohio. The implement had been subjected to oxydizing agencies characteristic of the deeply covered strata of that immediate vicinity. It is impossible briefly to detail this evidence. We must therefore wait for its full publication by Professor Claypole.

In a word, the geological situation at New London, Ohio, is this: The watershed between the Great Lakes and the Ohio is but a few miles to the south, and drains to the north through the main valley of Vermillion River. The land about New London is level for several miles, and is about two hundred feet below the summit of the watershed. There is no opportunity for any disturbances to have occurred subsequent to the glacial period; but in the retreat of the ice from the watershed a temporary glacial lake doubtless occupied the upper part of the valley of Vermillion River, emptying its waters into a tributary of the Mohican, and thence into the Muskingum and the Ohio. But this lake evidently did not exist for a great length of time.

Heretofore numerous flying reports of the discovery of implements in the glacial till have been made, but this is the first instance where the evidence has seemed in itself altogether convincing and satisfactory.

RELATIVE EFFICIENCY OF ANIMALS AS MACHINES.[1]

By Manly Miles, Lansing, Mich.

In my paper on Energy as a Factor in Rural Economy, read at the Washington meeting of the Association, approximate quantitative estimates were made of the energy expended

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[1] Read in Section F. at the Buffalo meeting of the American Association of Science, Aug., 1896.